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REMARKS

Claims 1 through 6, 8 through 11, 19, 20 and new Claims 21 and 22 are pending in the application.

Claims 1, 19 and 20 have been amended to reflect that in advantageous embodiments the recited low-flammability of the inventive films is imparted entirely by flame retardant consisting of one or more organic phosphorous compounds. Support for this amendment can be found in the Application-as-filed, for example on Page 9, 3rd full paragraph in its entirety.

Claim 1 has been amended to clarify that the films of the invention advantageously exhibit a longitudinal modulus of elasticity of greater than 3200 N/mm² after the film has been heat-treated for 100 hours at 100 °C. Support for this amendment can be found in the Application-as-filed, for example on Page 15, 2nd and 4th full paragraphs in their entirety; Page 17, 1st full paragraph in its entirety and Page 5, 2nd full paragraph in its entirety.

Claims 1, 19 and 20 have been amended to remove process limitations from the recited product claims.

Claims 21 and 22 have been added to complete the record for examination and highlight advantageous embodiments of the invention.

Claim 21 is directed to multi-layered biaxially oriented film having a base layer disposed between two outer layers. The film includes (i) crystallizable thermoplastic, (ii) UV stabilizer in the outer layers alone and (iii) flame retardant in the base layer alone. The recited films comply with the conditions of UL 94 for flame retardance and further exhibit no surface cracking after 1000 hours weathering in accordance with ISO 4892. Support for Claim 21 can be found in the Application-as-filed, for example on Page 13,

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1st, 5th and 6th paragraphs in their entirety; Page 24, line 1 through Page 26, line 13 (Example 2) and Page 14, 2nd, 3rd, 4th and 6th paragraphs in their entirety.

Claim 22 is directed to beneficial aspects of such advantageous films further comprising hydrolysis stabilizer in the base layer alone. Support for Claim 22 can be found in the Application-as-filed, for example on Page 15, 3rd paragraph in its entirety.

Reexamination and reconsideration of this application, withdrawal of all rejections, and formal notification of the allowability of the pending claims are earnestly solicited in light of the remarks which follow.

The Claimed Invention is Patentable
in Light of the Art of Record

Claims 1, 2 and 4 through 8 stand rejected over German Patent Application DE 19630599 A1 to Murschall et al. (DE 599) in view of United States Patent No. 4,265,804 to Zannuci et al. (US 804) and United States Patent No. 5,936,048 to Olshl et al. (US 048).

Claim 3 stands rejected over the foregoing references, and further in view of United States Patent No. 6,251,505 to Rakos et al. (US 505).

Claims 9 and 10 stand rejected over the foregoing references as applied to Claim 1 above, and further in view of United States Patent No. 5,866,246 to Schreck et al. (US 246) and United States Patent No. 5,008,313 to Kishida et al. (US 313).

Claim 11 stands rejected over the foregoing references as applied to Claims 9 and 10 above and further in view of United States Patent No. 4,551,485 to Ragan et al. (US 485).

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It may be useful to briefly consider the invention before addressing the merits of the rejection.

There remains a need in the art for low-flammability, UV-resistant transparent films having improved physical properties at elevated temperatures. Low-flammability articles are generally known, such as low-flammability articles formed from phospholane-modified polymers. However, such polymers cake when processed in conventional dryers. Furthermore, the articles formed from such polymers become brittle at elevated temperatures in as little as 48 hours, making the articles unusable industrially. (The Examiner's attention is kindly directed to the Application-as-filed on Page 2, final paragraph in its entirety – Page 3, first full paragraph in its entirety, as well as Page 4).

Quite unexpectedly, Applicants found that predrying and/or precrystallization of flame retardant masterbatches using gradual heating results in the production of low-flammability film without any such caking in the dryer. Furthermore, films in accordance with the invention do not become brittle as quickly upon exposure to elevated temperature; i.e. the films of the invention do not become brittle even after heat treatment for 100 hours at 100 °C, as reflected in Claim 1 as-amended.

Accordingly, the claims are directed to transparent, low-flammability, UV-resistant, biaxially oriented film having a thickness of from 5 to 300 μm . The films include at least one crystallizable thermoplastic and at least one UV stabilizer. The recited low-flammability is imparted entirely by flame retardant consisting of one or more organic phosphorous compounds. Surprisingly, low-flammability films in accordance with the invention exhibit a longitudinal modulus of elasticity of greater than 3200 N/mm² after the film has been heat-treated for 100 hours at 100 °C.

In particularly advantageous embodiments, the films of the invention include a base layer disposed between two outer layers. UV stabilizer is incorporated into the

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outer layers alone and flame retardant is incorporated into the base layer alone. Films in accordance with this advantageous embodiment comply with the conditions of UL 94 and further exhibiting no surface cracking after 1000 hours weathering in accordance with ISO 4892, as recited in Claim 21. In further beneficial aspects of such embodiments, films in accordance with the invention may further include hydrolysis stabilizer within the base layer alone, as recited in Claim 22.

The cited references do not teach or suggest the claimed invention, considered either alone or in combination.

DE 599 discloses the incorporation of UV stabilizer and one or more antioxidants into cast sheet to avoid yellowing in outdoor applications. Applicants respectfully reiterate that DE 599 is directed to polyethylene terephthalate cast sheet. The cast sheet ranges in total thickness from about 0.8 to 20 millimeter. The working examples of DE 599 have a thickness of 4 millimeter.

The cast films of DE 599 may have either a multilayer or monolayer construction. DE 599 indicates that its antioxidant may be found within any of the layers of its films.

Applicants respectfully reiterate that DE 599 does not teach or suggest the recited biaxially oriented film. DE 599 thus does not teach or suggest such biaxially oriented films ranging in total thickness from 5 to 300 microns.

Nor does DE 599 teach or suggest the recited low-flammability imparted entirely by flame retardant consisting of one or more organic phosphorous compounds. And DE 599 most certainly does not teach or suggest such low-flammability films retaining a longitudinal modulus of elasticity of greater than 3200 N/mm² following heat treatment.

DE 599, broadly noting that its active ingredient may be present in any of its layers, also does not teach or suggest multi-layered biaxially oriented films that include

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UV stabilizer in the outer layers alone and flame retardant in the base layer alone that further comply with the conditions of UL 94 and exhibit no surface cracking after 1000 hours weathering in accordance with ISO 4892, as recited in Claim 21. Nor does DE 599 teach or suggest such films further including hydrolysis stabilizer in the base layer alone, as recited in Claim 22.

Applicants thus respectfully submit that the claimed invention is patentable in light of DE 599, considered either alone or in combination with the art of record.

US 804 does not cure the deficiencies in DE 599.

US 804 is merely directed to resins incorporating particular multichromophoric ultraviolet stabilizers. (Col. 2, lines 9 – 13). US 804 incorporates the particular multichromophoric stabilizers in an attempt to address deficiencies noted within more conventional ultraviolet stabilizers. Considered in its entirety, US 804 expressly notes that "it is known" that polyesters "do not respond well" when conventional ultraviolet stabilizers, such as hydroxybenzophenones, are used. (Col. 2, lines 20 – 25).

US 804 provides a laundry list of further additives that may be included within its films, including pigments and the like. (Col. 7, lines 44 – 51). US 804 is altogether silent as to the incorporation of flame retardants, however.

US 804 merely broadly notes that its resins may be used to form films. (Col. 1, lines 62 – 64). The working example of US 804 indicates that its films are mono-layered. (Col. 8, lines 43 – Col. 11, line 16).

Applicants respectfully reiterate that US 804 does not teach or suggest the recited low-flammability films, and particularly not the recited films incorporating flame retardant consisting of one or more organic phosphorous compounds.

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Nor does US 804 teach or suggest the recited low-flammability films retaining a longitudinal modulus of elasticity of greater than 3200 N/mm² following heat treatment.

US 804, merely generically noting that its resins may be used to form films, also does not teach or suggest multi-layered biaxially oriented films that include UV stabilizer in the outer layers alone and flame retardant in the base layer alone that further complies with the conditions of UL 94 and exhibits no surface cracking after 1000 hours weathering in accordance with ISO 4892, as recited in Claim 21. Nor does US 804 teach or suggest such films further including hydrolysis stabilizer in the base layer alone, as recited in Claim 22.

Applicants thus respectfully submit that the claimed invention is patentable in light of US 804, considered either alone or in combination with the art of record.

US 048 does not cure the deficiencies in DE 599 or US 804.

US 048 is directed to resins intended for use as durable items, electrical materials and the like. (Col. 1, lines 20 – 26). Exemplary articles formed from the resins of US 048 include bathtubs, toilets, car bumpers and the like. (Col. 20, lines 31 – 38). In fact, US 048 provides a laundry list of suitable applications. (Col. 20, lines 38 – 56). Films are noticeably absent from the list, however.

Applicants respectfully reiterate that US 048 is directed to methods for bonding norbornenyl-based flame retardants to polymer resins. (Col. 4, lines 40 – 45; Col. 7, lines 60 – 66 and Col. 9, line 66 – Col. 10, line 3 and Col. 9, lines 37 – 49). US 048 expressly describes its modified resins as “quite different” from “known” compounds. (Col. 2, lines 49 – 50). The modified resins may further be reacted with an epoxide to impart additional properties. (Col. 3, lines 15 – 20). Applicants respectfully submit that the primary purpose of such epoxide modified resin is nevertheless flame retardance,

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and hence it (and the base norbornenyl-modified resin) would clearly be excluded from the claims-as-amended.

Furthermore, in contrast to the opinion urged within the outstanding Office Action, Applicants continue to respectfully submit that, considered in its entirety, US 048 discourages the use of phosphorous-containing compounds alone. In particular, US 048 expressly notes that the flame retardance provided by phosphorus containing compounds is "insufficient" if the compounds are used alone. (Col. 3, lines 49 – 50). In contrast to the urgings within the Office Action, US 048 then goes on to state that "known" flame retarding methods, i.e. methods that do not incorporate its norbornenyl-modified resins, are "insufficient and impractical." (Col. 4, lines 31 – 32). Hence US 048 clearly indicates that articles including conventional flame retardants would not provide sufficient levels of flame retardancy. Further, the noted examples within Table 3 all include a mixture of flame retardants, including US 048's particular norbornenyl-based flame retardant resin. (Col. 52, lines 49 – 51 and Col. 38, lines 45 – 50).

Applicants respectfully reiterate that US 048 does not teach or suggest the recited biaxially oriented low-flammability films, and particularly not such films whose low-flammability properties are imparted entirely by flame retardants consisting of one or more organic phosphorous compounds. In fact, US 048, considered in its entirety, strongly teaches away from such films. Furthermore, to modify US 048 so as to avoid the inclusion of its norbornenyl-modified flame retardant resin would clearly render the resulting articles unfit for their intended purpose. MPEP 2143.01 (citing *In re Gordon*, 221 USPQ 1125 (Fed. Cir. 1984)).

Nor does US 048 teach or suggest the recited low-flammability film retaining a longitudinal modulus of elasticity of greater than 3200 N/mm² following heat treatment.

US 048, altogether silent as to biaxially oriented films, most certainly does not teach or suggest such films having a multi-layered construction that includes at least

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one UV stabilizer in the outer layers alone at least one flame retardant in the base layer alone and that further complies with the conditions of UL 94 and exhibits no surface cracking after 1000 hours weathering in accordance with ISO 4892, as recited in Claim 21. Nor does US 048 teach or suggest such films further including hydrolysis stabilizer in the base layer alone, as recited in Claim 22.

Applicants thus respectfully submit that the claimed invention is patentable in light of US 048, considered either alone or in combination with the art of record.

Applicants respectfully reiterate that there would have been no motivation to have combined these references. Applicants respectfully submit that merely because the references can be combined is not enough, there must still be a suggestion. MPEP 2143.01 (section citing Mills). DE 699 is directed to cast sheet having improved yellowness. US 804 is directed to multi-chromophoric UV stabilizers. US 048 is directed to flame retardant norbornenyl-modified resins for durable goods. These are altogether different problems solved, to say the least.

Applicants respectfully submit that the Office Action is instead indulging in impermissible hindsight by merely picking and choosing elements from the prior art, rather than considering the teachings of the references as a whole.

Nevertheless, even if the foregoing references were combined (which Applicants submit should not be done), the claimed invention would not have resulted. In particular, the combination of references would not result in the recited biaxially oriented films whose low-flammability is imparted entirely by flame retardants consisting of one or more organic phosphorous compounds, and most certainly not such films retaining a longitudinal modulus of elasticity of greater than 3200 N/mm² after heat treatment.

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Nor would the combination result in films having a multi-layered construction that includes at least one UV stabilizer in the outer layers alone at least one flame retardant in the base layer alone and that further complies with the conditions of UL 94 and exhibits no surface cracking after 1000 hours weathering in accordance with ISO 4892, as recited in Claim 21; much less such films further including hydrolysis stabilizer in the base layer alone, as recited in Claim 22.

Accordingly, Applicants respectfully submit that the claimed invention is patentable in light of DE 599, US 804 and US 048, considered either alone or in combination.

Claim 3 is similarly patentable in light of the foregoing references and further in view in US 505.

US 505 is generally directed to the use of light diffusing filler within the outer layer of translucent films intended for backlit displays. (Col. 2, line 66 – Col. 3, line 8). In contrast to the recited transparent films, US 505 requires translucent films so that the back of the frame and the light source is not visible through unprinted areas. (Col. 1, lines 23 – 25, (noting that it is important that the films be "translucent rather than transparent")). US 505 notes light transmissions of 30% as acceptable. (Col. 3, lines 41 – 42). The working examples indicate light transmissions ranging from 50 to 70%. (Col. 7, line 65 – Col. 9, line 55). US 505 further expressly notes that although the films may not be opaque, any light traveling through the film thickness must be highly diffused, i.e. the films of US 505 are required to have a sufficiently elevated level of haze. (Col. 1, lines 45 – 50). US 505 provides a laundry list of additives. (Col. 6, lines 42 – 53). Flame retardants are noticeably absent from the list, however.

Applicants respectfully reiterate that US 505 does not teach or suggest the recited transparent, UV-resistant, low-flammability films, and most certainly not such transparent films exhibiting the recited luminous transmittance of >80%; a surface gloss

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of >100 and a haze of $\leq 20\%$. In fact, considered in its entirety, US 505 teaches away from transparent, high gloss, low haze films by requiring translucent films that diffuse light. Furthermore, to modify US 505 so as to produce the recited transparent film having the recited optical properties would clearly render the resulting films unfit for their intended purpose.

Nor does US 505 teach or suggest the recited low-flammability films, and particularly not such films whose low-flammability is imparted entirely by flame retardants consisting of one or more organic phosphorous compounds. And US 048 most certainly does not teach or suggest the recited low-flammability film retaining a longitudinal modulus of elasticity of greater than 3200 N/mm^2 following heat treatment.

Applicants further respectfully reiterate that there similarly would have been no motivation to have combined these references.

However, even if combined (which Applicants submit should not be done), the claimed invention would not have resulted. DE 599 is directed to cast sheet. US 804 is directed to particular multichromophoric stabilizers. US 048 is directed to flame retardant norbornenyl - modified resins. US 505 requires translucent films.

Consequently, even if combined, the recited transparent, UV-resistant, biaxially oriented film whose low-flammability is imparted entirely by flame retardant consisting of one or more organic phosphorous compounds would not result, and most certainly not such films exhibiting the recited luminous transmittance of $>80\%$; a surface gloss of >100 and a haze of $\leq 20\%$. And the combination most certainly does not teach or suggest the recited low-flammability film retaining a longitudinal modulus of elasticity of greater than 3200 N/mm^2 following heat treatment.

Accordingly, Applicants respectfully submit that Claim 3 is patentable in light of US 505, considered either alone or in combination with the art.

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Claims 9 and 10 are similarly patentable in light of foregoing primary and secondary references and further in view of US 246 and US 313.

US 246 is generally directed to non-transparent polyolefin films, particularly opaque polyolefin films, incorporating hollow bodies. (Col. 2, lines 25 – 26; Col. 15, line 44 – Col. 16, line 50 and see Col. 1, lines 15 – 18 (noting that films can roughly be divided into two classes, i.e. transparent films and non-transparent films)). The films of US 246 address the chalking found in conventional non-transparent filled films by incorporating incompatible polymeric hollow bodies to form vacuoles in lieu of conventional fillers. (Col. 2, lines 43 – 50 and Col. 1, lines 8 - 10). US 246 notes that the films refract light, i.e. produce haze, due to microcavities present between the film matrix and the incompatible polymeric particulate. (Col. 4, lines 39 – 42). US 246 discloses a number of additives suitable for its films. (Col. 11, lines 15 – 25). US 246 does not note the incorporation of flame retardants, however.

Applicants respectfully reiterate that US 246, directed to opaque films, does not teach or suggest the recited transparent films, and most certainly not the recited transparent, biaxially oriented films exhibiting the a luminous transmittance of > 80% and a haze of $\leq 20\%$. In fact, to modify US 246 so as to produce the recited transparent film having the recited optical properties would clearly render the resulting films unfit for their intended purpose.

Nor does US 246 teach or suggest the recited low-flammability films, and particularly not such films whose low-flammability is imparted entirely by flame retardants consisting of one or more organic phosphorous compounds. And US 246 most certainly does not teach or suggest the recited low-flammability films retaining a longitudinal modulus of elasticity of greater than 3200 N/mm² following heat treatment.

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Accordingly, Applicants respectfully submit that Claims 9 and 10 are patentable in light of US 246, considered either alone or in combination with the art of record.

US 313 is generally directed to resins incorporating butadiene polymer as an impact modifier. (Col. 2, lines 29 – 36). The impetus of US 313 is the further incorporation of a particular stabilizer mixture to improve the heat resistance of the butadiene. (Col. 2, lines 30 – 39). The stabilizer mixture includes required quantities of a thioether stabilizer, a phosphite stabilizer and a phenol heat stabilizer. (Col. 2, lines 46 – 51). US 313 expressly notes that each of the three stabilizers must be present; otherwise "a desirable effect cannot be obtained." (Col. 4, lines 29 – 38). US 313 notes a list of further additives that may be included within its films, including crystallization promoters and the like. (Col. 5, lines 30 – 39). Flame retardants are noticeably absent from the list.

US 313 is generally silent as to the ultimate form the resins take, other than a generic reference to the formation of "shaped articles." (Col. 2, lines 35 – 36). However, the background of US 313 is directed to molded parts, such as produced by injection molding, and injection-molded articles are produced within the examples. (Col. 1, lines 18 – 23; Col. 6, lines 60 – 62; Col. 7, lines 64 – 65; Col. 8, lines 63 – 65, lines 32 – 35; and Col. 11, lines 10 – 11).

US 313, considered in its entirety, does not teach or suggest the recited transparent films of the invention, and most certainly not the transparent, biaxially oriented films of the claimed invention exhibiting the recited luminous transmittance of >80% and a haze of ≤20%.

Nor does US 313 teach or suggest the recited low-flammability films, and particularly not such films whose low-flammability is imparted entirely by flame retardants consisting of one or more organic phosphorous compounds. And US 313

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most certainly does not teach or suggest the recited low-flammability films retaining a longitudinal modulus of elasticity of greater than 3200 N/mm² following heat treatment.

US 313, requiring the presence of thioether and phosphite stabilizers, further does not teach or suggest the recited films including hydrolysis stabilizer selected from the group consisting of alkali metal stearates, alkaline earth metal stearates, alkali metal carbonates, alkaline earth metal carbonates, or phenolic stabilizers, as recited in Claims 9 and 10.

Accordingly, Applicants respectfully submit that Claims 9 and 10 are patentable in light of US 313, considered either alone or in combination with the art of record.

Applicants respectfully reiterate that there similarly would have been no motivation to have combined these references. Applicants respectfully reiterate that, rather than consider the teachings of the references as a whole, the Office Action is instead indulging in impermissible hindsight by merely picking and choosing elements from the prior art.

However, even if combined (which Applicants submit should not be done), the claimed invention would not have resulted. DE 599 is directed to cast sheet. US 804 is merely directed to particular multichromophoric stabilizers. US 048 is directed to flame retardant norbornenyl - modified resins. US 246 is directed to non-transparent films. US 313 is directed to injection molded parts.

Consequently, even if combined, the recited transparent, UV-resistant, biaxially oriented film whose low-flammability is imparted entirely by flame retardant consisting of one or more organic phosphorous compounds would not result, and most certainly not such films exhibiting the recited luminous transmittance of >80%; a surface gloss of >100 and a haze of ≤20%.

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Nor does the combination teach or suggest the recited low-flammability films retaining a longitudinal modulus of elasticity of greater than 3200 N/mm^2 following heat treatment.

The combination additionally fails to teach or suggest the recited films including hydrolysis stabilizer selected from the group consisting of alkali metal stearates, alkaline earth metal stearates, alkali metal carbonates, alkaline earth metal carbonates, or phenolic stabilizers, as recited in Claims 9 and 10.

Applicants thus respectfully submit that Claims 9 and 10 are patentable in light of US 246 and US 313, considered either alone or in combination with the remaining art of record.

Claim 11 is likewise patentable in light of the combination of foregoing references and further in view of US 485.

US 485 is directed to reinforced injection molding compositions that incorporate silane to improve the impact resistance of the resulting molded article. (Col. 1, lines 45 – 51). US 485 is more specifically directed to impact modified reinforced resins which are injection moldable at a relatively low mold temperature. (Col. 1, lines 7 – 10). Suitable reinforcing fillers for use in US 485 include fibers, whiskers and the like. (Col. 6, lines 57 – 58).

US 485, directed to reinforced molding compositions, does not teach or suggest the recited transparent films of the invention, and most certainly not the transparent, biaxially oriented films of the claimed invention exhibiting the recited luminous transmittance of $>80\%$ and haze of $\leq 20\%$.

Nor does US 485 teach or suggest the recited low-flammability films retaining a longitudinal modulus of elasticity of greater than 3200 N/mm^2 following heat treatment.

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Accordingly, Applicants respectfully submit that Claim 11 is patentable in light of US 485, considered either alone or in combination with the art of record.

Applicants again respectfully reiterate that there similarly would have been no motivation to have combined these references. Applicants further respectfully reiterate that the references must be considered as a whole.

However, even if combined (which Applicants submit should not be done), the claimed invention would not have resulted. DE 599 is directed to cast sheet. US 804 is merely directed to particular multichromophoric stabilizers. US 048 is directed to norbornenyl - modified flame retardant resins. US 246 is directed to non-transparent films. US 313 and US 485 are directed to injection-molded parts.

Consequently, even if combined, the recited transparent, biaxially oriented film whose low-flammability is imparted entirely by flame retardant(s) consisting of one or more organic phosphorous compounds would not have resulted, and particularly not such films exhibiting the recited luminous transmittance of $> 80\%$; a surface gloss of > 100 and a haze of $\leq 20\%$.

And the combination most certainly would not result in the recited low-flammability films retaining a longitudinal modulus of elasticity of greater than 3200 N/mm^2 following heat treatment.

Accordingly, Applicants respectfully submit that Claim 11 is patentable in light of US 485, considered either alone or in combination with the remaining art of record.

Based on the foregoing, Applicants respectfully submit that the claimed invention is patentable in light of the cited art, considered either alone or in combination.

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Conclusion

It is respectfully submitted that Applicants have made a significant and important contribution to the art, which is neither disclosed nor suggested in the art. It is believed that all of pending Claims 1 through 6, 8 through 11 and 19 through 22 are now in condition for immediate allowance. It is requested that the Examiner telephone the undersigned if any questions remain to expedite examination of this application.

It is not believed that extensions of time or fees are required, beyond those which may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time and/or fees are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required is hereby authorized to be charged to Deposit Account No. 50-2193.

Respectfully submitted,



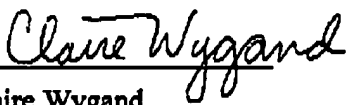
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Claire Wygand